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United States
Department of
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Soil
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Bozeman,
Montana

Montana Water Supply Outlook

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February 1, 1989

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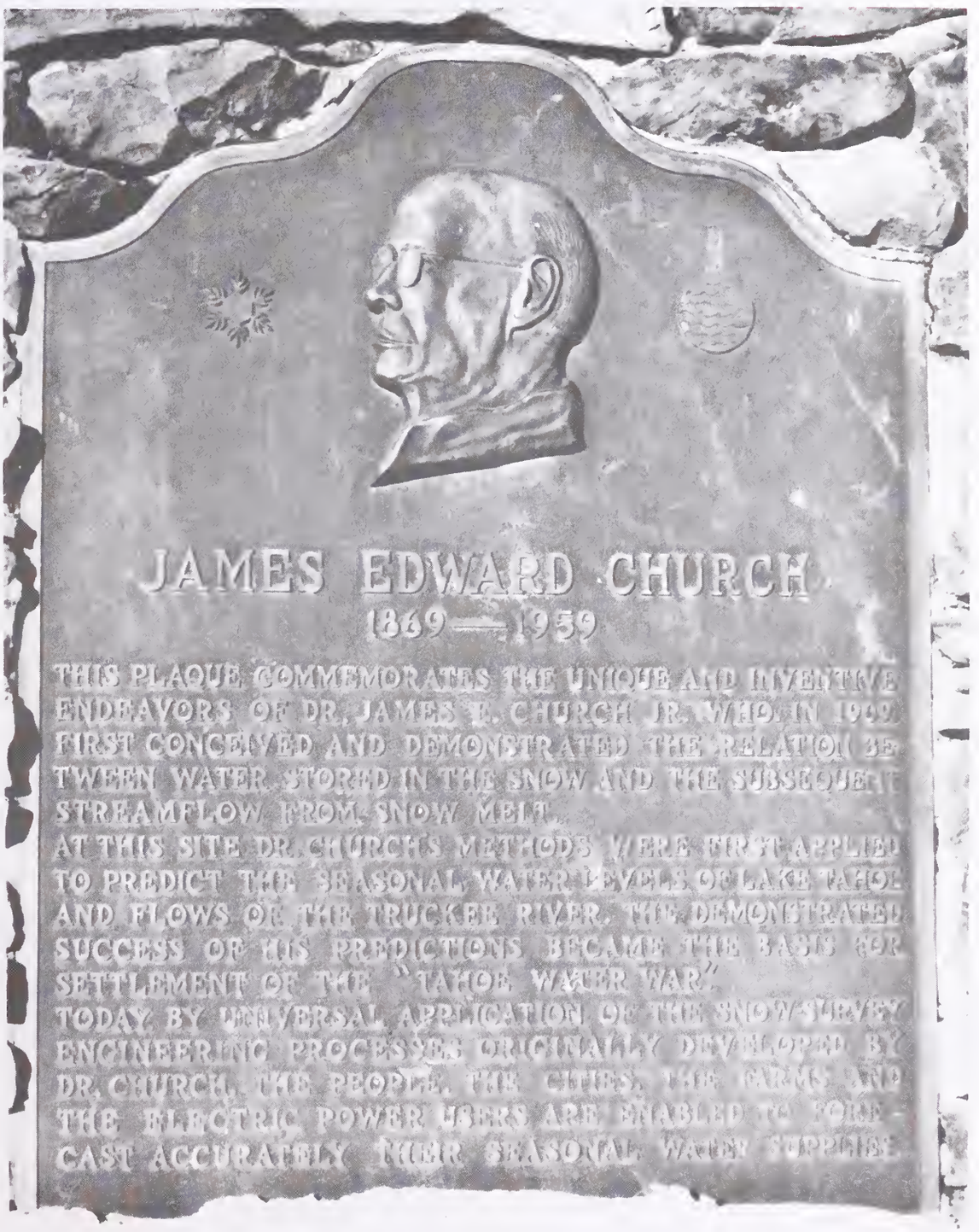
JAMES EDWARD CHURCH
1869 — 1959
THIS PLAQUE COMMEMORATES THE UNIQUE AND INVENTIVE
ENDEAVORS OF DR. JAMES E. CHURCH JR. WHO IN 1909
FIRST CONCEIVED AND DEMONSTRATED THE RELATION BE-
TWEEN WATER STORED IN THE SNOW AND THE SUBSEQUENT
STREAMFLOW FROM SNOW MELT.
AT THIS SITE DR. CHURCH'S METHODS WERE FIRST APPLIED
TO PREDICT THE SEASONAL WATER LEVELS OF LAKE TAHOE
AND FLOWS OF THE TRUCKEE RIVER. THE DEMONSTRATED
SUCCESS OF HIS PREDICTIONS BECAME THE BASIS FOR
SETTLEMENT OF THE "TAHOE WATER WAR."
TODAY, BY UNIVERSAL APPLICATION OF THE SNOW SURVEY
ENGINEERING PROCESSES ORIGINALLY DEVELOPED BY
DR. CHURCH, THE PEOPLE, THE CITIES, THE FARMS AND
THE ELECTRIC POWER USERS ARE ENABLED TO FORE-
CAST ACCURATELY THEIR SEASONAL WATER SUPPLIES

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Foreword

How Forecasts Are Made

Most of the annual streamflow in the Western United States originates as snowfall that has accumulated high in the mountains during winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Predictions are based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are combined with snowpack data to prepare runoff forecasts. Streamflow forecasts are coordinated by Soil Conservation Service and National Weather Service hydrologists. This report presents a comprehensive picture of water supply outlook conditions for areas dependent upon surface runoff. It includes selected streamflow forecasts, summarized snowpack and precipitation data, reservoir storage data, and narratives describing current conditions.

Snowpack data are obtained by using a combination of manual and automated measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semi-monthly schedule during the winter. In addition, snow water equivalent, precipitation and temperature are monitored on a daily basis and transmitted via radio telemetry to central data collection facilities. Both monthly and daily data are used to project snowmelt runoff.

An error is associated with each forecast, and this error decreases as the season progresses and more data becomes available. To express the range of error that can be expected, "most probable" forecasts are issued along with a range representing a "reasonable minimum" and a "reasonable maximum". Actual streamflow can be expected to fall within this range in eight out of ten years. Additionally two specific scenarios are provided based on the assumption that subsequent precipitation will be "wet", above average, or "dry", below average.

For More Information

Copies of Monthly Water Supply Outlook Reports and other reports may be obtained from the states listed below. An annual snow survey data summary is published by the Soil Conservation Service for each of the western states. Historical snow survey data may be obtained at those same offices.

STATE	ADDRESS
Alaska	201 East 9th Ave., Suite 300. Anchorage, AK 99501-3687
Arizona	201 East Indianola Ave., Suite 200, Phoenix, AZ 85012
Colorado	2490 West 26th Ave., Building A, 3rd floor, Denver, CO 80211
Idaho	3244 Elder Street, Room 124, Boise, ID 83705
Montana	10 East Babcock, Room 443, Federal Building, Bozeman, MT 59715
Nevada	1201 Terminal Way, Room 219, Reno, NV 89502
New Mexico	517 Gold Ave. S.W., Room 3301, Albuquerque, NM 87102-3157
Oregon	1220 Southwest 3rd Ave., Room 1640, Portland, OR 97204
Utah	4402 Federal Building, 125 South State Street, Salt Lake City, UT 84147
Washington	W. 920 Riverside, Room 360, Spokane, WA 99201-1080
Wyoming	Federal Building, 100 "B" Street, Room 3124, Casper, WY 82601

In addition to state reports, a Water Supply Outlook for the Western United States is published by the Soil Conservation Service and National Weather Service monthly, January through May. Reports may be obtained from the Soil Conservation Service, West National Technical Center, 511 Northwest Broadway, Room 248, Portland, OR 97209-3489.

Water supply reports published by other agencies:

California — Snow Survey Branch, California Department of Water Resources, P.O. Box 388, Sacramento, CA 95802; British Columbia — The Ministry of Environment, Water Investigations Branch, Parliament Buildings, Victoria, British Columbia, V8V 1X5; Yukon Territory — Department of Indian and Northern Affairs, Northern Operations Branch, 200 Range Road, Whitehorse, Yukon Territory, Y1A3V1; Alberta, Environment Technical Services Division, 9820 106th St., Edmonton, Alberta T5K 2J6.

Montana
Water Supply Outlook

and

Federal - State - Private
Cooperative Snow Surveys

Issued by

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Programs and assistance of the United States Department of Agriculture are available without regard to race, creed, color, sex, age, or national origin.

ON THE COVER:

This plaque on the outlet gate at Lake Tahoe, Nevada, commemorates the start of snow surveys in 1909.

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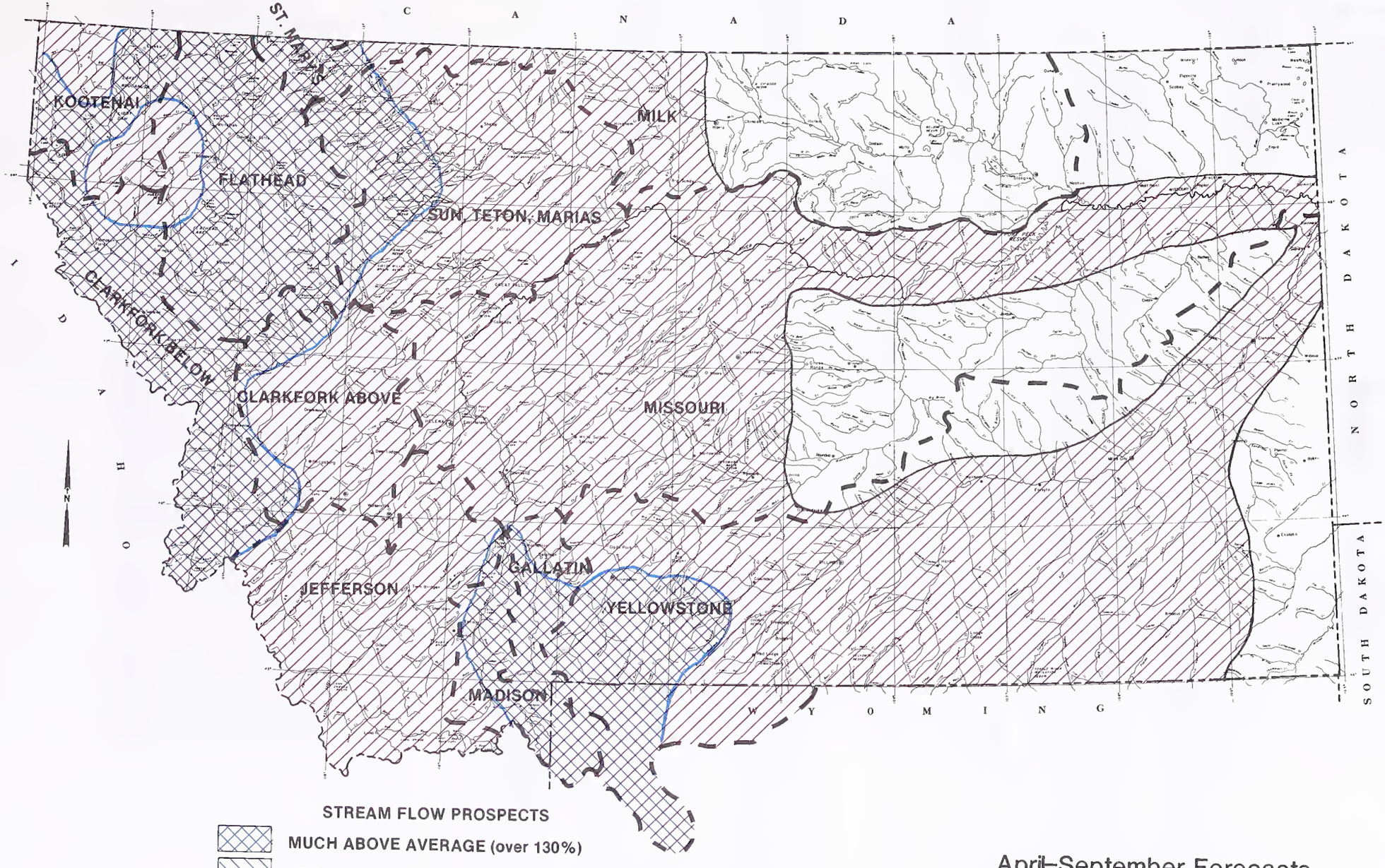
U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

STREAMFLOW PROSPECTS FOR MONTANA
Spring and Summer Period



April–September Forecasts
February 1, 1989

0 25 50 75 100 MI

0 50 100 150 KM

SOURCE:
Information provided by SCS Snow Survey Personnel.

JUNE 1985 4-R-39296

USDA-SCS-FORT WORTH, TEXAS-1985

General Outlook

Hydrologic Effect Of 1988 Fires

The SCS has developed preliminary estimates of the increased spring runoff expected to occur as a result of fires during the summer of 1988. Current estimates will be revised as more site information is assembled and procedures are refined. Increases are included in the forecast values and in all appropriate downstream forecasts.

Based on currently available information, the following increases are projected for the affected forecast points included in this report:

Location	% Drainage burned*	% Increased Runoff Apr-Jul	Apr-Sep
Clark Fork above Missoula			
• Lower Willow Creek Reservoir Inflow	9	5	5
Madison			
• Madison River near Grayling	38	13	12
Gallatin			
• Gallatin River near Gateway	7	3	3
Sun-Teton-Marias			
• Sun River at Gibson Dam	7	1	1
Yellowstone			
• Yellowstone River at Lake Outlet	42	15	14
• Yellowstone River at Corwin Springs	41	11	11
• Stillwater River near Absarokee	5	2	2
• Clarks Fork River near Belfry	10	3	3

* Only considers timbered areas with canopy burn.

Summary

Most drainages received average or above average moisture during January. Snowpacks are near average over much of the State but some areas in central Montana still have below average snow. Soils under the snowpack are generally drier than normal. Streamflows are expected to be near to a little below average for most of the watersheds in the northwestern part of the State and in the Yellowstone and Madison River headwaters. Most other drainages are forecast to have below average runoff with most in the 80 to 90 percent of average range.

Snowpack

Much of the State has snowpacks that are near average. This is the first year since 1982 that snow cover has been near average over most of the State. However, there are some areas that still have below average snow. These are in the southern part of the Upper Clark Fork west of the Divide, in part of the Gallatin River Drainage around Bozeman, small mountain ranges in central Montana, the Milk River Drainage and drainages that flow into the Yellowstone River below Livingston. By February 1, normally 60 percent of the season's snowpack is on the ground.

Precipitation

Mountain precipitation was near to above average over most of the drainages in Montana for January. Only the Gallatin River Basin showed below average moisture for the month. Much of this moisture came in the first half of the month.

Reservoirs

Generally most irrigation reservoirs have below average storage. However, those in the St. Mary, Marias, Sun and Yellowstone River drainages are reporting near to above average storage.

Streamflow

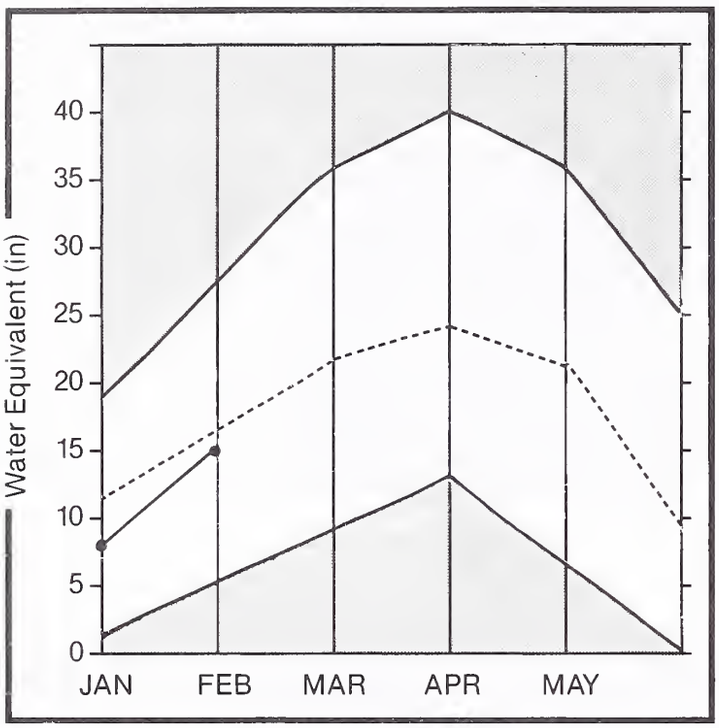
Most streams in the northwestern part of the State and the Yellowstone and Madison River headwaters are forecast to produce near to a little below average flows this spring and summer. Most other drainages are expected to have runoff between 80 and 90 percent of average. In all areas, runoff is expected to be more than was observed last season unless future precipitation patterns show a significant decrease.

Soil Moisture

Soils under the snowpack are drier than usual over most of the State. Some of this spring's snowmelt will be required to recharge those soils before runoff can begin.

Kootenai Basin

Mountain snowpack* (inches)



*Kootenai in Montana

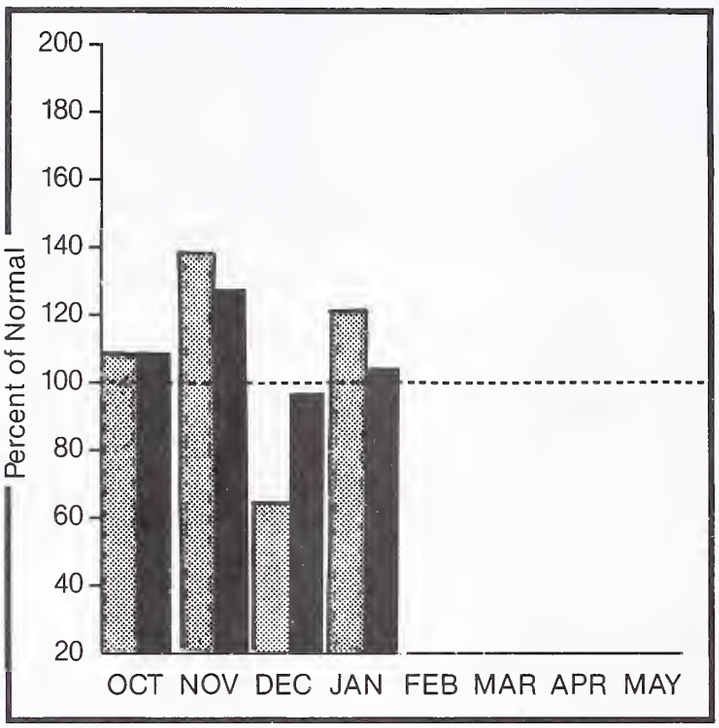
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

Mountain precipitation was above average in January. The snowpack in British Columbia is near average while in Montana it is about 10 percent below average. Spring and summer streamflow is expected to vary from near average on the main stem of the Kootenai River to below average on some of the tributary streams in Montana.

For more information contact your local Soil Conservation Service office.

KOOTENAI RIVER BASIN in Montana

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
KOOTENAI bl Libby Dam (2)	APR-JUL	5600	95			6840	4310	5885
	APR-SEP	6570	95			8020	5050	6903
FISHER nr Libby	APR-JUL	210	88	260	157	275	143	240
	APR-SEP	225	88	270	171	295	153	256
YAAK nr Troy	APR-JUL	415	84	490	335	555	275	494
	APR-SEP	440	85	510	370	585	295	517
KOOTENAI at Leonia (2)	APR-JUL	7030	96			8640	5420	7340
	APR-SEP	8090	96			9950	6230	8441

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
LAKE KOOCANUSA	5748.0	1731.0	2079.0	2484.0

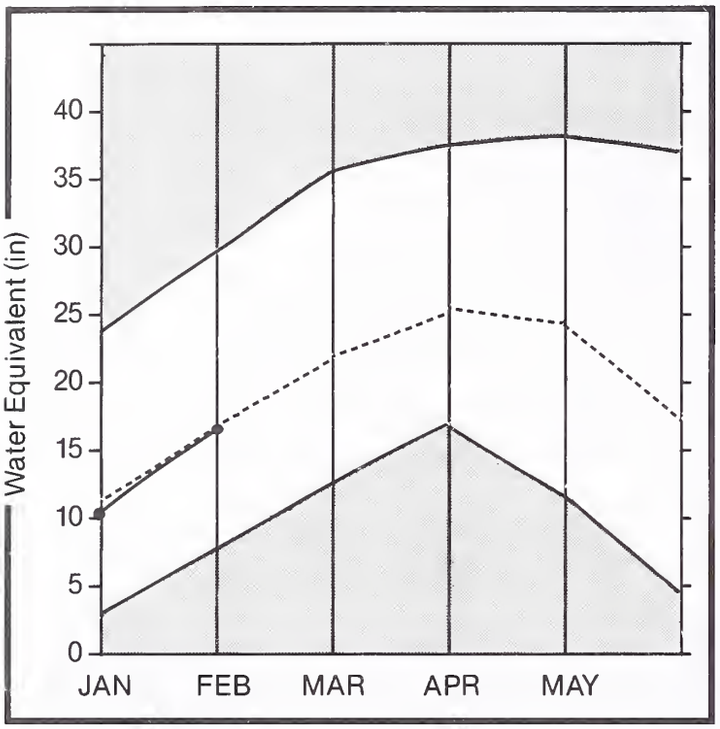
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	THIS YEAR AS % OF AVERAGE
EAST KOOTENAI in B.C.	14	155	104
KOOTENAI in MONTANA	18	164	92
KOOTENAI ab BONNERS FERRY	31	161	97

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Flathead Basin

Mountain snowpack* (inches)



*Flathead

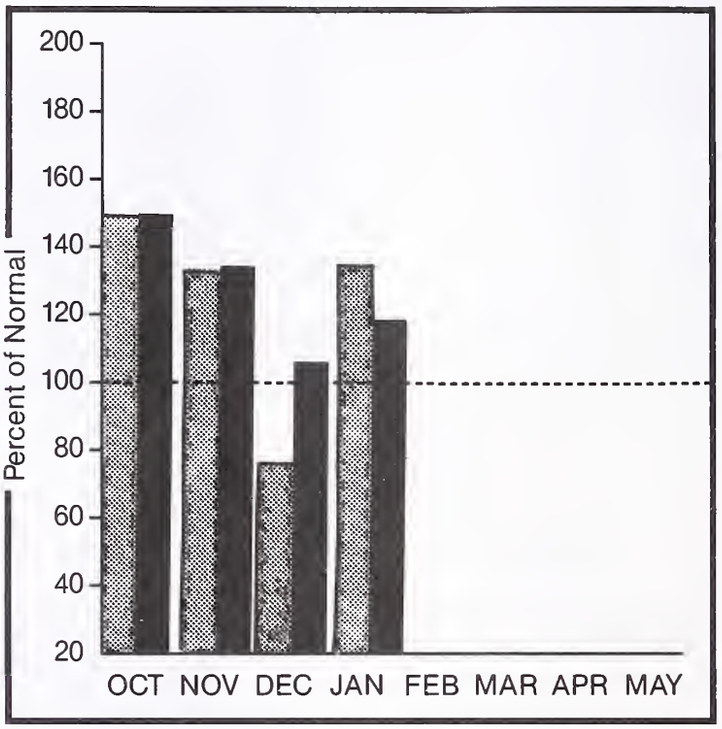
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

During January, the mountain precipitation was above average. This increased the mountain snowpack to near average in most drainages. April through September runoff is forecast to be near average for most watersheds in the Flathead River Drainage.

For more information contact your local Soil Conservation Service office.

FLATHEAD RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
NF FLATHEAD nr Columbia Falls	APR-JUL	1620	95	1810	1430	1930	1330	1701
	APR-SEP	1800	96	1990	1610	2140	1460	1880
MF FLATHEAD nr West Glacier	APR-JUL	1610	96	1830	1390	1910	1310	1680
	APR-SEP	1760	96	1940	1580	2090	1430	1836
SF FLATHEAD nr Columbia Falls (1)	APR-JUL	2050	97	2350	1820	2600	1520	2110
	APR-SEP	2190	97	2460	1920	2770	1610	2248
FLATHEAD at Columbia Falls (1)	APR-JUL	5460	97	6080	4840	6700	4220	5621
	APR-SEP	5930	97	6420	5440	7280	4580	6114
SWAN nr Bigfork	APR-JUL	595	100	655	535	700	490	597
	APR-SEP	670	98	730	610	795	545	683
FLATHEAD nr Polson (2)	APR-JUL	6490	99	7150	5830	7680	5370	6586
	APR-SEP	7050	99	7550	6550	8340	5760	7150

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
CAMAS (4)	45.2	6.2	14.9	20.1
MISSION VALLEY (8)	100.0	21.7	26.4	36.8
HUNGRY HORSE	3451.0	1520.0	1887.0	2406.0
FLATHEAD LAKE	1791.0	782.6	840.2	1133.0

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
NORTH FORK FLATHEAD	14	173	103
MIDDLE FORK FLATHEAD	9	164	95
SOUTH FORK FLATHEAD	10	170	101
STILLWATER-WHITEFISH	5	184	101
SWAN	8	170	108
LITTLE BITTERROOT	3	168	82
FLATHEAD	36	170	102

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
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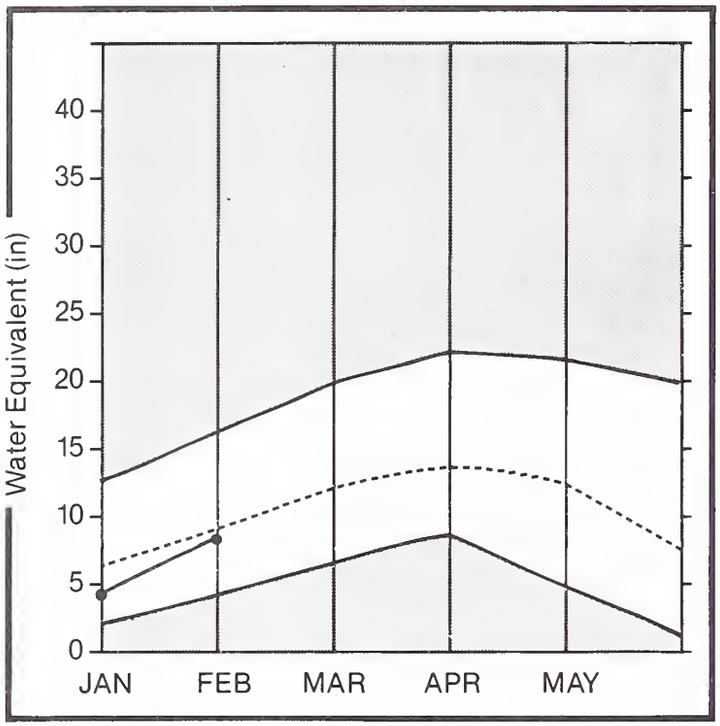
(2) - Corrected for upstream diversions or changes in reservoir storage.

Clark Fork Basin above Missoula

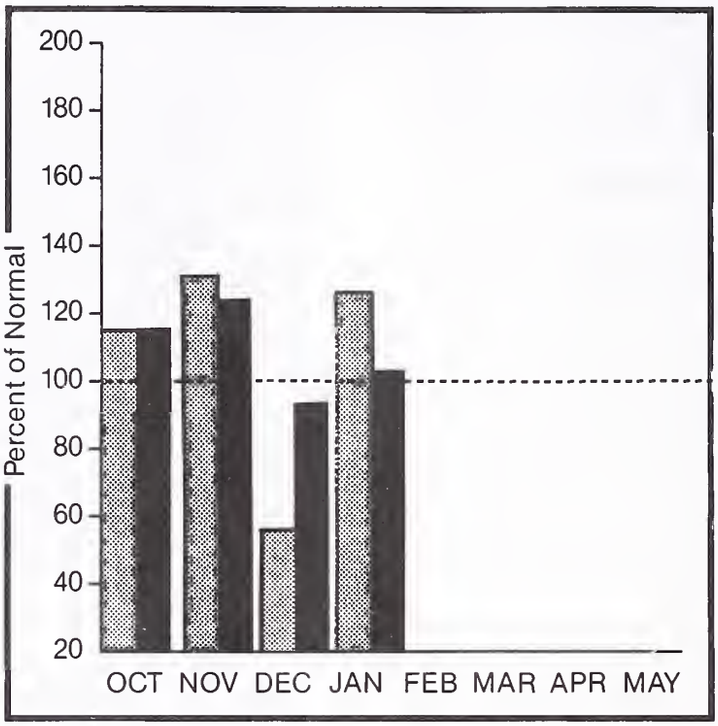
Mountain snowpack* (inches)



*Clark Fork above Missoula

Maximum
Average
Minimum
Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation
Year to date precipitation

Water Supply Outlook

Mountain precipitation was above average for January. The snowpack has increased to below average in the Clark Fork Headwaters and to near average in the Blackfoot River Drainage. Spring and summer runoff is forecast to be a little below average in the Clark Fork Watershed and near average on the Blackfoot River. NOTE: The January 1 forecasts for this basin were printed on page 27 in the January Water Supply Outlook Report.

For more information contact your local Soil Conservation Service office.

CLARK FORK RIVER BASIN above Missoula

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
MOULTON RESERVOIR inflow (2)	APR-JUN	180	76	230	130	245	114	237
	APR-JUL	200	76	260	142	275	126	263
WARM SPRINGS CK nr Anaconda (2)	APR-JUL	29	74	36	22	40	18.1	39
	APR-SEP	36	73	44	29	50	22	49
FLINT CK nr Southern Cross (2)	APR-JUL	12.1	82	16.8	7.4	17.7	6.5	14.8
	APR-SEP	14.2	80	19.9	8.3	21	7.4	17.8
FLINT CK bl Boulder Ck (2)	APR-JUL	51	84	69	32	74	28	61
	APR-SEP	65	83	85	42	95	35	78
LOWER WILLOW CK RES inflow (2)	APR-JUL	12.4	84	19.0	5.8	18.1	6.7	14.9
	APR-SEP	13.7	87	19.7	7.7	19.7	7.7	15.8
MF ROCK CK nr Philipsburg	APR-JUL	64	93	76	52	83	45	69
	APR-SEP	71	92	83	59	93	49	77
NEVADA CK nr Finn	APR-JUL	16.3	78	23	10.0	24	8.3	21
	APR-SEP	17.5	80	25	10.9	26	9.1	22
BLACKFOOT nr Bonner	APR-JUL	820	94	995	635	970	665	874
	APR-SEP	910	94	1080	715	1080	735	969
CLARK FORK ab Milltown (2)	APR-JUL	585	85	750	440	835	355	703
	APR-SEP	685	84	840	530	960	410	812
CLARK FORK ab Missoula	APR-JUL	1410	89	1730	1060	2010	810	1577
	APR-SEP	1590	89	1950	1230	2270	915	1781

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
GEORGETOWN LAKE	31.0	25.3	26.5	27.2
LOWER WILLOW CREEK	4.9	0.8	1.3	1.5
NEVADA CREEK		NO REPORT		

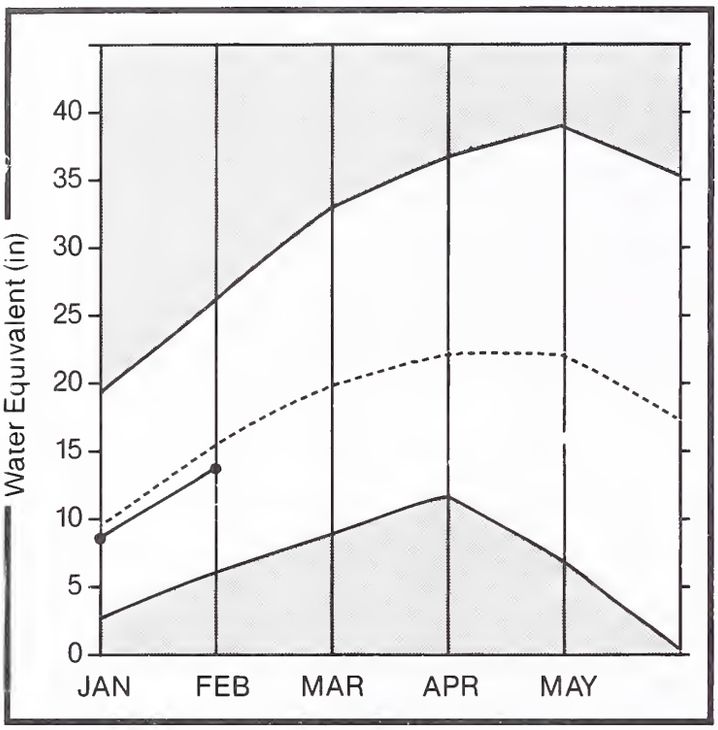
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
CLARK FORK ab BLACKFOOT	32	133	87
BLACKFOOT	16	156	98
CLARK FORK above MISSOULA	43	141	90

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Clark Fork Basin below Missoula

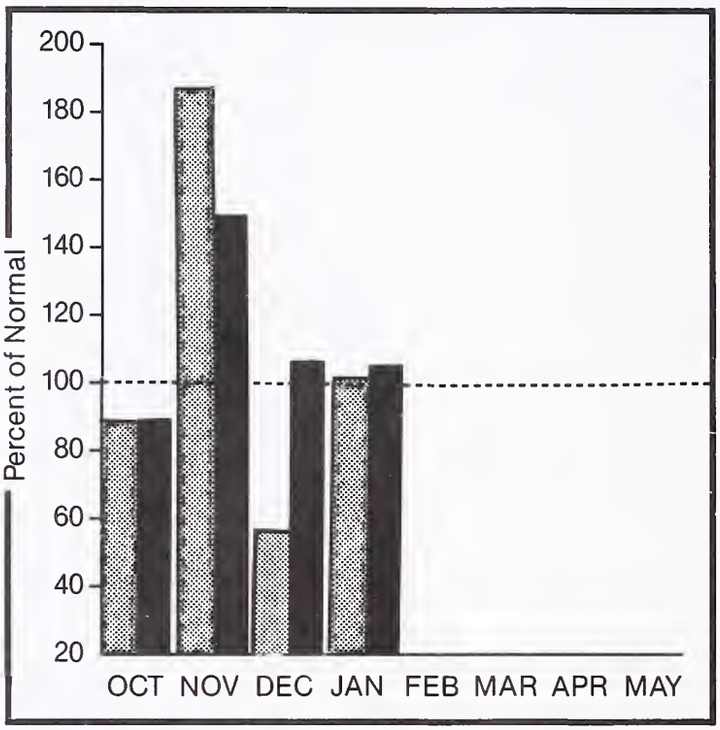
Mountain snowpack* (inches)



*Bitterroot

Maximum
Average
Minimum
Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation
Year to date precipitation

Water Supply Outlook

Mountain precipitation for January was near average over the basin. The snowpack remains a little below average on the Bitterroot River Headwaters and on the headwaters of streams flowing into the Clark Fork River below Missoula. Streamflow is forecast to be a little below average from most drainages.

For more information contact your local Soil Conservation Service office.

CLARK FORK RIVER BASIN below Missoula

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
CLARK FORK ab Missoula	APR-JUL	1410	89	1730	1060	2010	810	1577
	APR-SEP	1590	89	1950	1230	2270	915	1781
WF BITTERROOT nr Conner (2)	APR-JUL	142	97	183	99	183	101	147
	APR-SEP	154	91	196	110	200	107	169
BITTERROOT nr Darby	APR-JUL	505	96	620	390	650	360	524
	APR-SEP	555	97	670	435	715	395	573
ROCK CK nr Darby	APR-JUL	80	101			95	65	80
	APR-SEP	84	100			99	69	84
SKALKAHO CK nr Hamilton	APR-JUL	43	93	53	34	51	35	46
	APR-SEP	49	91	59	39	59	39	54
BURNT FORK CK nr Stevensville (2)	APR-JUL	29	91	34	24	38	20	32
	APR-SEP	34	89	40	29	45	23	38
BITTERROOT at Missoula (2)	APR-JUL	1320	96	1570	1070	1700	920	1371
	APR-SEP	1430	96	1700	1160	1850	1010	1497
CLARK FORK bl Missoula	APR-JUL	2730	93	3320	2140	3320	2140	2948
	APR-SEP	3030	92	3620	2440	3690	2370	3276
CLARK FORK at St. Regis	APR-JUL	3590	92			5070	2110	3894
	APR-SEP	3980	92			5620	2340	4325
CLARK FORK nr Plains (2)	APR-JUL	10300	95			13200	7370	10850
	APR-SEP	11300	95			14500	8080	11930
THOMPSON nr Thompson Falls	APR-JUL	180	81	215	144	240	122	222
	APR-SEP	205	82	240	175	270	140	250
PROSPECT CK at Thompson Falls	APR-JUL	115	90	133	97	151	79	128
	APR-SEP	124	91	142	106	162	86	137
CLARK FORK at Whitehorse Rapids (2)	APR-JUL	11300	93			14600	7900	12150
	APR-SEP	12400	93			16100	8660	13370

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
PAINTED ROCKS LAKE	31.7	0.0	---	15.2
NOXON RAPIDS	335.0	325.1	324.7	314.2
COMO	34.9	9.9	5.0	11.4

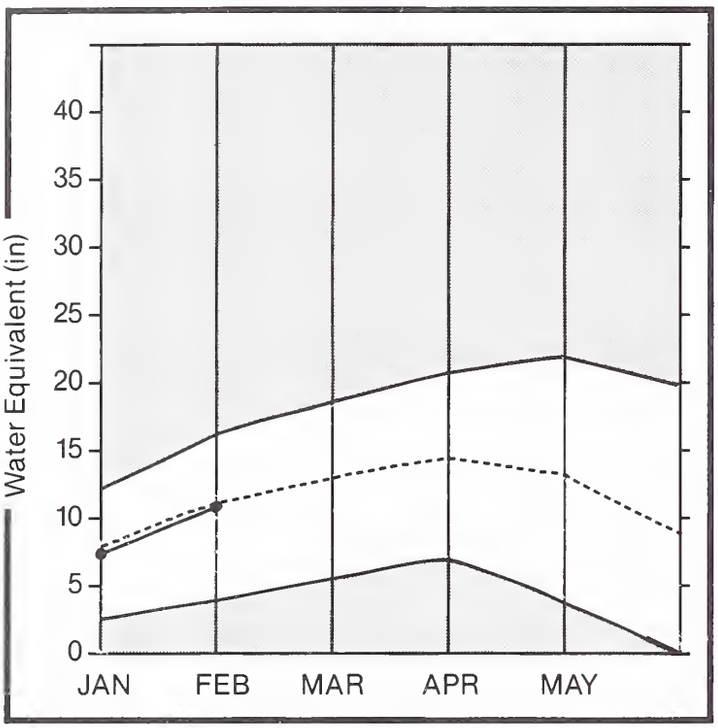
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	THIS YEAR AS % OF AVERAGE
CLARK FORK above MISSOULA	43	141	90
BITTERROOT	14	135	96
LWR CLARK FK blw MISSOULA	16	156	91
BITTERROOT & LWR C.F.	28	148	94
CLARK FORK TOTAL	68	146	93
FLATHEAD	35	170	102
PEND O'REILLE	98	155	95

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Jefferson Basin

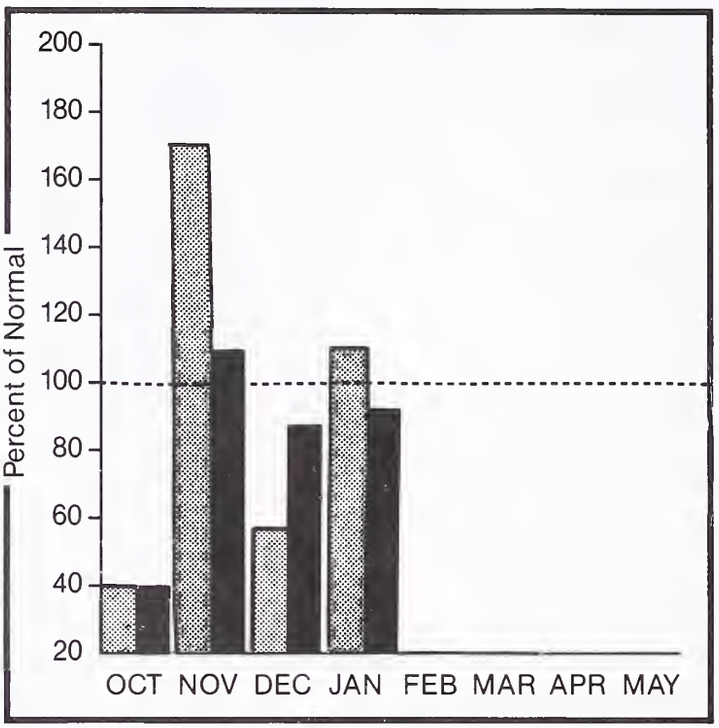
Mountain snowpack* (inches)



*Jefferson

Maximum
Minimum
Average
Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation
Year to date precipitation

Water Supply Outlook

January mountain precipitation was a little above average. Snowpack is above average in the Red Rock River Drainage, a little below average in the Ruby and Big Hole River headwaters and below average in the Boulder River Watershed. Forecasts for April through September runoff are 10 to 15 percent below average. Soils under the snowpack are drier than normal.

For more information contact your local Soil Conservation Service office.

JEFFERSON RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
RED ROCK RIVER near Monida 2	APR-JUL	93	89	135	51	131	55	105
	APR-SEP	99	87	147	51	140	58	114
BEAVERHEAD RIVER near Grant 2	APR-JUL	128	86	245	62	182	74	149
	APR-SEP	147	84	295	77	210	84	175
BEAVERHEAD RIVER at Barratts 2	APR-JUL	160	83	285	77	230	91	192
	APR-SEP	183	82	340	91	265	102	224
RUBY RIVER near Alder	APR-JUL	75	84	109	41	105	45	89
	APR-SEP	91	86	126	56	127	55	106
BIG HOLE RIVER near Melrose	APR-JUL	580	83	915	245	805	355	696
	APR-SEP	650	86	1010	285	890	410	757
WILLOW CREEK near Harrison	APR-JUL	15.0	80	29	7.0	22	7.9	18.7
	APR-SEP	16.6	79	33	7.4	25	8.6	21
BOULDER RIVER near Boulder	APR-JUL	78	86	142	37	108	48	91
	APR-SEP	84	87	152	39	116	52	97
JEFFERSON RIVER near Three Forks	APR-JUL	840	81	1530	390	1220	465	1042
	APR-SEP	950	82	1690	440	1370	535	1156

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
LIMA	84.0	9.8	11.6	35.6
CLARK CANYON	255.6	103.1	167.3	144.5
RUBY RIVER	38.8	21.1	23.0	23.8

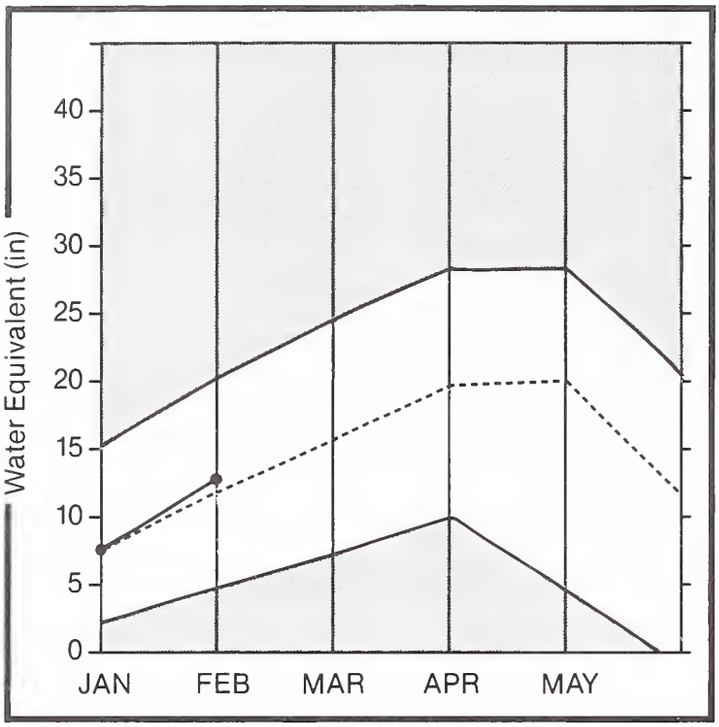
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	THIS YEAR AS % OF AVERAGE
BEAVERHEAD	19	171	120
RUBY	4	151	97
BIGHOLE	17	137	95
BOULDER	13	147	86
JEFFERSON	44	157	106

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Madison Basin

Mountain snowpack* (inches)

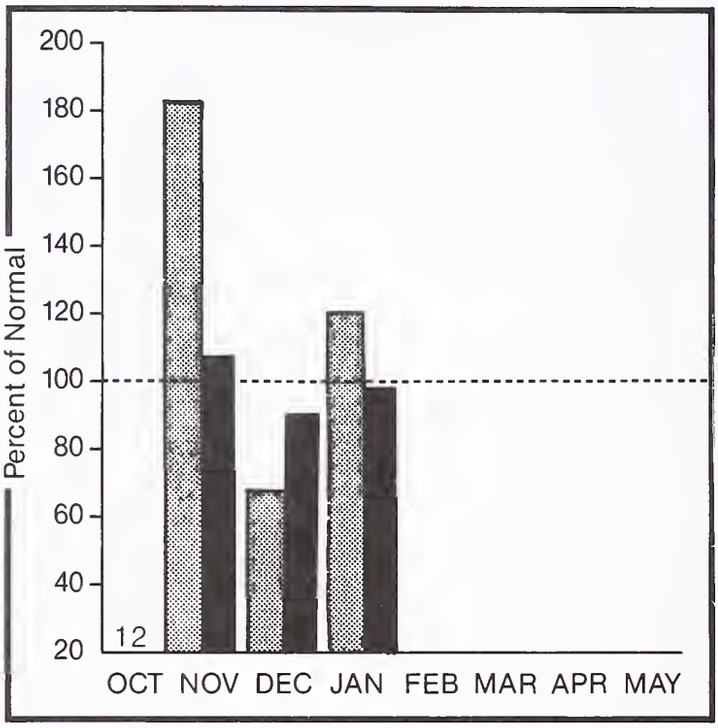


*Madison

Maximum ———— Average – – – –

Minimum ———— Current ●———●

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation ▯ Year to date precipitation ■

Water Supply Outlook

The mountain precipitation for January was above average over the basin. The snowpack in the upper basin is above average and near average in the lower part of the watershed. Runoff is forecast to be a little above average as a result of good snow cover and increased yield due to this past summer's fires. NOTE: For more information see Hydrologic Effect of the 1988 Fires on Page 4 of the Water Supply Outlook Report.

For more information contact your local Soil Conservation Service office.

MADISON RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
MADISON RIVER near Grayling 2	APR-JUL	425	109	540	310	500	350	390
	APR-SEP	535	107	675	395	630	440	499
MADISON RIVER near McAllister 2	APR-JUL	715	105	975	455	850	580	680
	APR-SEP	885	103	1170	610	1060	715	856

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
ENNIS LAKE	41.0	31.0	31.6	34.7
HEBGEN LAKE	377.5	266.3	275.2	242.0

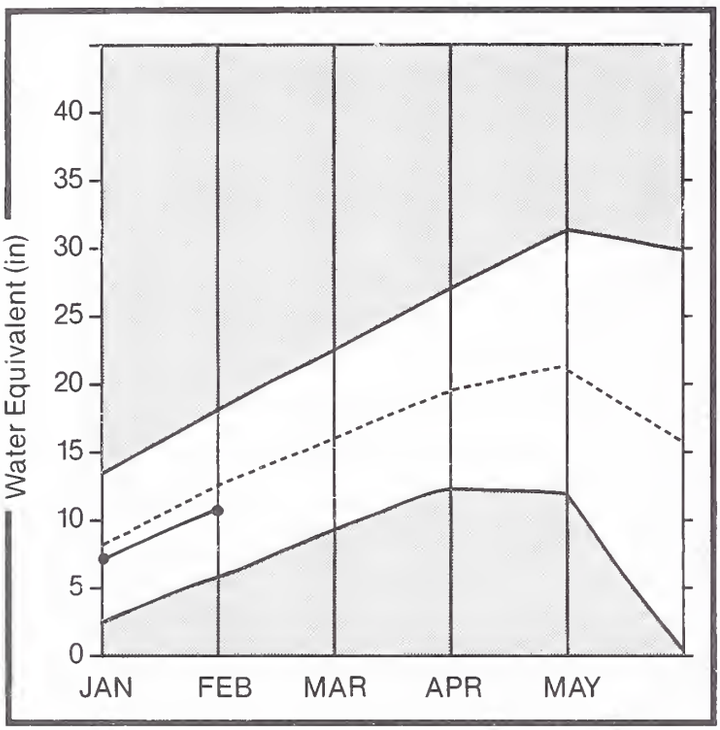
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	THIS YEAR AS % OF AVERAGE
MADISON above HEBGEN	9	150	105
LOWER MADISON	9	143	96
MADISON	18	147	101

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Gallatin Basin

Mountain snowpack* (inches)



*Gallatin

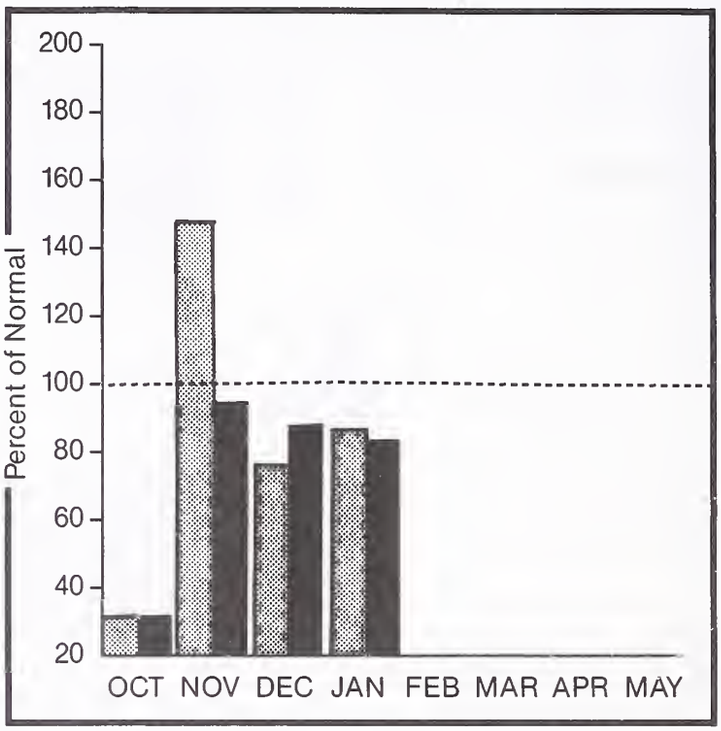
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

During January, mountain precipitation was a little below average. The snowpack is now about 15 to 20 percent below average over the basin. Spring and summer runoff is expected to be 10 to 15 percent below average on most streams. However, this is much greater than last year's runoff.

For more information contact your local Soil Conservation Service office.

GALLATIN RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
GALLATIN RIVER near Gateway	APR-JUL	410	89	610	210	500	320	460
	APR-SEP	480	89	680	280	590	370	540
E & W FK. HYALITE CR. nr Bozeman 2	APR-JUL	21	88	31	10.9	26	16.0	24
	APR-SEP	24	86	36	12.2	30	18.1	28
HYALITE CREEK near Bozeman 2	APR-JUL	33	87	52	14.0	41	25	38
	APR-SEP	37	84	58	16.3	47	27	44
GALLATIN RIVER at Logan	APR-JUL	460	87	795	205	610	310	528
	APR-SEP	530	86	875	265	700	360	616

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
MIDDLE CREEK	8.0	3.9	6.1	3.4

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
UPPER GALLATIN	9	135	85
EAST GALLATIN	12	130	80
GALLATIN	18	134	85

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
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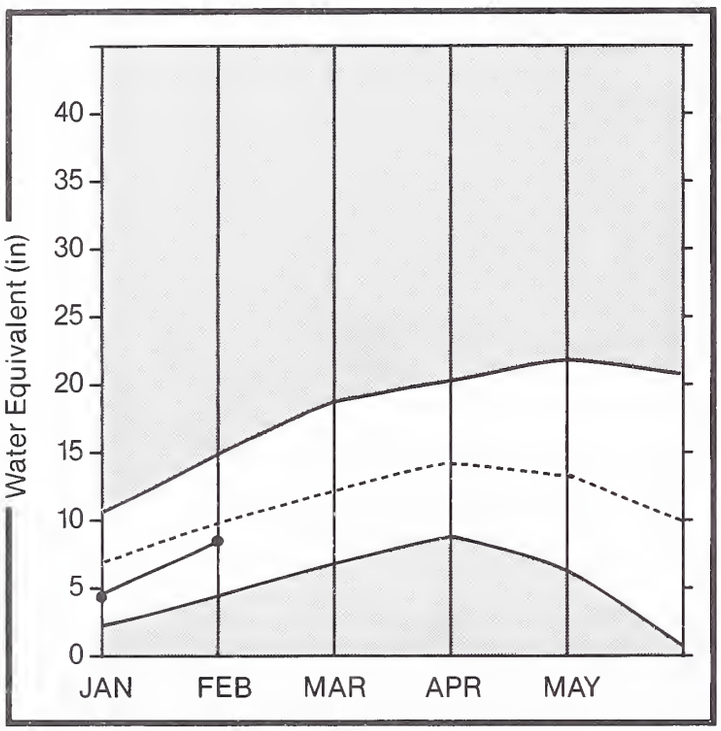
(2) - Corrected for upstream diversions or changes in reservoir storage.

Missouri Basin

Mountain snowpack* (inches)



*Missouri Toston to Fort Peck

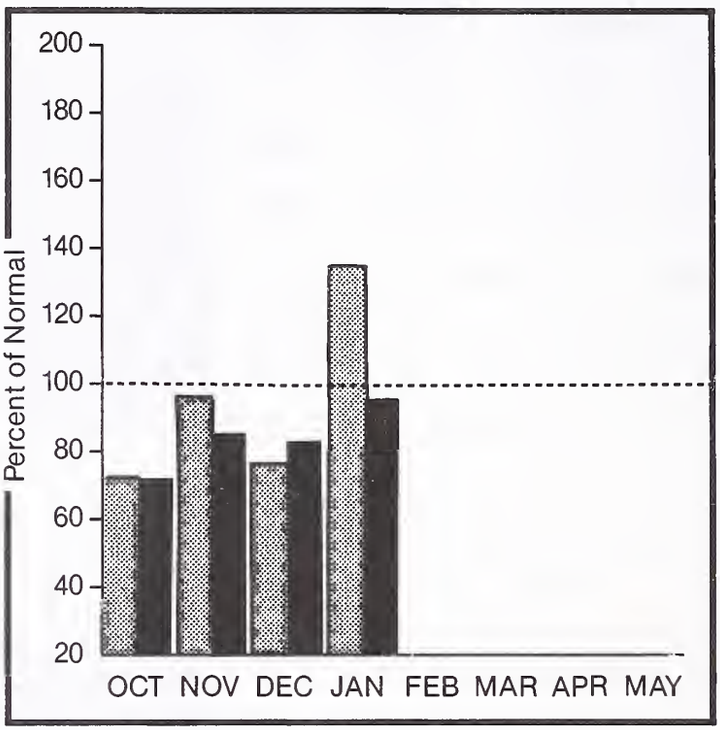
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

January precipitation was above average in the mountains. This raised the snowpack levels up from January 1 but it still remains below average in most drainages. Streamflow forecasts are for below average runoff on most watersheds.

For more information contact your local Soil Conservation Service office.

MISSOURI RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
MISSOURI RIVER at Toston 2	APR-JUL	2020	90			2670	1390	2250
	APR-SEP	2340	90			3090	1590	2590
PRICKLY PEAR CREEK nr Clancy	APR-JUL	21	81	37	9.0	32	10.1	26
	APR-SEP	25	81	44	11.1	38	12.0	31
SMITH RIVER nr Ft. Logan	APR-JUL	54	79	103	24	81	27	68
	APR-SEP	65	81	118	28	97	33	80
SHEEP CREEK nr White Sulphur Spgs.	APR-JUL	15.6	83	23	8.3	23	7.7	18.8
	APR-SEP	18.5	84	26	9.9	28	9.3	22
BELT CREEK near Monarch	APR-JUL	96	78	160	32	143	49	123
	APR-SEP	104	78	171	37	155	53	134
MISSOURI RIVER at Fort Benton 2	APR-JUL	2930	84			4110	1820	3470
	APR-SEP	3540	89			4900	2220	3990
MISSOURI RIVER at Virgelle 2	APR-JUL	3400	86			5060	2050	3960
	APR-SEP	4000	89			5890	2430	4500
MISSOURI RIVER near Landusky 2	APR-JUL	3760	87			5570	2170	4310
	APR-SEP	4430	90			6540	2620	4900
N.F. MUSSELSHELL near Delpine	APR-JUL	4.8	87	7.8	1.8	7.2	2.4	5.6
	APR-SEP	5.6	89	8.9	2.3	8.3	2.9	6.4
S.F. MUSSELSHELL above Martinsdale	APR-JUL	49	86	85	11.9	73	25	57
	APR-SEP	51	84	89	13.2	77	25	61
MISSOURI RIVER below Fort Peck 2	APR-JUL	3790	89			5750	2170	4260
	APR-SEP	4340	90			6550	2470	4800
LAKE SAKAKAWEA Inflow 2	APR-JUL	9680	88			13800	5940	11000
	APR-SEP	10800	89			15300	6770	12200

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
CANYON FERRY LAKE	2043.0	1377.0	1453.0	1621.0
HELENA VALLEY	9.2	4.9	5.6	5.2
LAKE HELENA	10.4	10.9	11.1	10.2
HAUSER & HELENA	61.9	63.1	63.6	60.9
HOLTER LAKE	81.9	80.0	78.6	71.6
SMITH RIVER	10.6	1.5	2.4	6.7
NEWLAN CREEK		NO REPORT		
BAIR	7.0	0.6	1.9	4.0
MARTINSDALE	23.1	0.2	3.1	9.9
DEADMAN'S BASIN	72.2	13.2	37.8	45.2
FORT PECK LAKE*	18.9	12.4	15.0	15.1

*Million Acre Feet

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
MISSOURI HEADWATERS	71	150	100
WEST SIDE MISSOURI	8	156	87
SMITH-BELT	5	151	92
MISSOURI MAINSTEM	13	153	90
SUN-TETON-MARIAS	9	164	99
JUDITH-MUSSELSHELL	8	135	82
MISSOURI above FORT PECK	91	151	99
MILK HEADWATERS	4	189	89
BEAR PAW	7	94	65
MILK RIVER	11	153	82
MISSOURI in MONTANA	100	151	98
MISSOURI blw YELLOWSTONE	185	137	90

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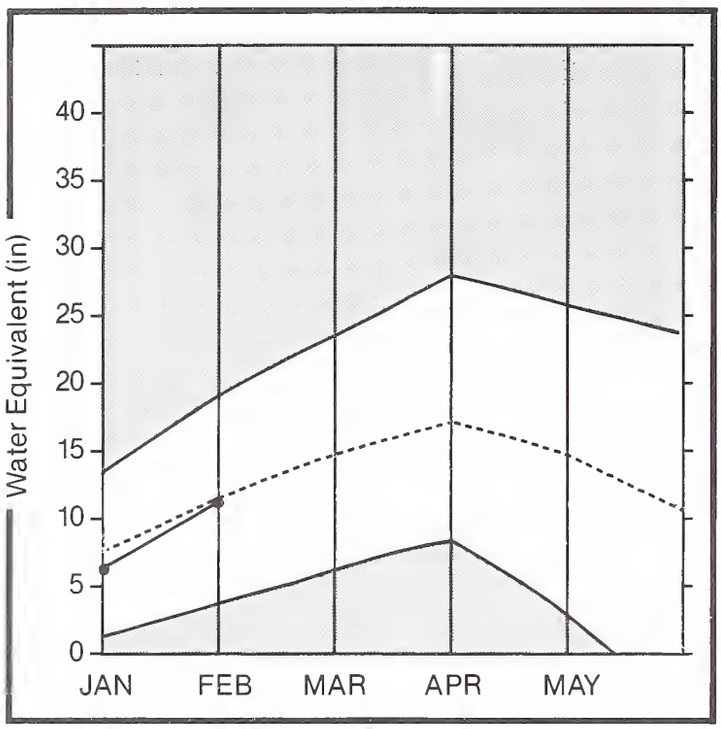
Sun, Teton and Marias Basins

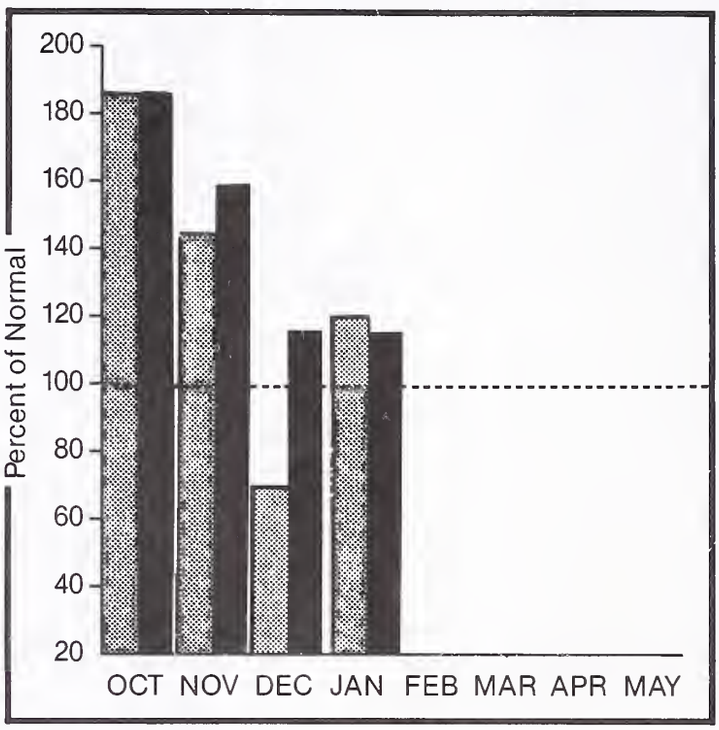
Mountain snowpack* (inches)



*Sun-Teton-Marias

Maximum
Minimum
Average
Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation
Year to date precipitation

Water Supply Outlook

Mountain precipitation was above average in January. Snowpack percentages increased during the past month and is now only a little below average. Spring and summer runoff is forecast to be near to a little below average on most drainages.

For more information contact your local Soil Conservation Service office.

SUN-TETON-MARIAS RIVER BASINS

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
SUN RIVER at Gibson Dam 2	APR-JUL	435	88	615	255	565	305	494
	APR-SEP	475	88	665	290	615	335	542
TWO MEDICINE CREEK near Browning 2	APR-JUL	215	97	305	126	300	131	222
	APR-SEP	225	96	315	136	310	140	235
BADGER CREEK near Browning	APR-JUL	105	98	142	68	146	64	107
	APR-SEP	122	99	163	81	166	78	123
SWIFT RESERVOIR Inflow nr Dupuyer	APR-JUL	67	96	91	43	94	40	70
	APR-SEP	78	95	103	53	108	48	82
MARIAS RIVER near Shelby	APR-JUL	405	85			745	250	478
	APR-SEP	425	85			780	260	501

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
GIBSON	99.1	24.8	51.0	43.0
FISHKUN	32.0	19.7	18.3	17.1
WILLOW CREEK	32.2	23.0	23.9	20.4
LOWER TWO MEDICINE LAKE	11.9	11.9	10.3	7.7
FOUR HORNS LAKE	19.2	14.0	13.7	12.3
SWIFT	30.0	11.6	23.2	13.6
LAKE FRANCES	112.0	41.6	93.9	68.5
LAKE ELWELL (TIBER)	1347.0	646.8	689.8	558.0

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
SUN-TETON	4	161	99
MARIAS	5	166	99
SUN-TETON-MARIAS	9	164	99

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
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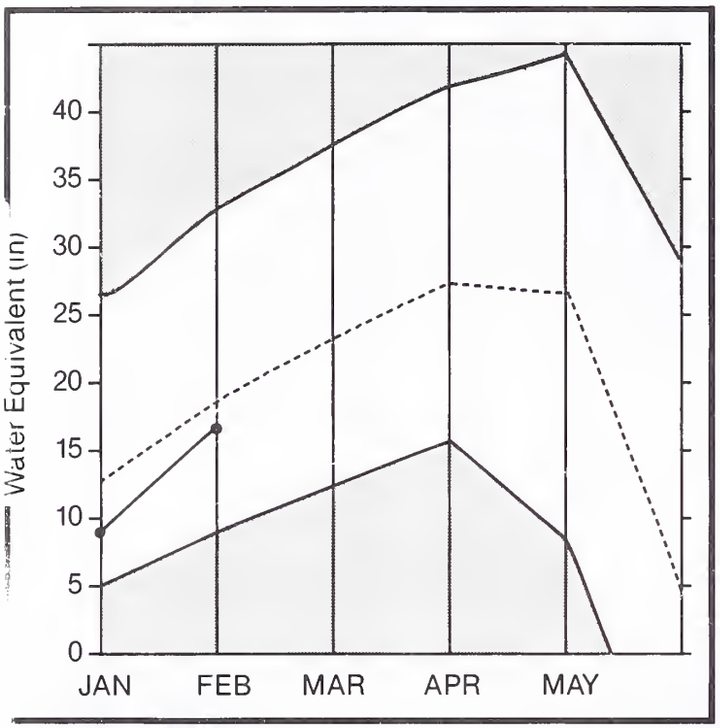
(2) - Corrected for upstream diversions or changes in reservoir storage.

St. Mary and Milk Basins

Mountain snowpack* (inches)



St. Mary

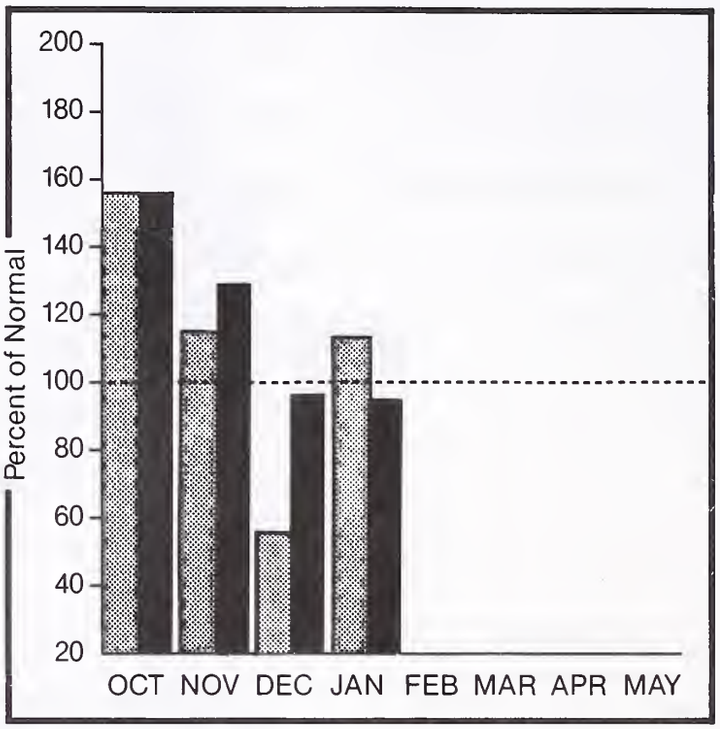
Maximum

Average

Minimum

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

January mountain precipitation was a little above average. Snowpack is a little below average in the Milk and St. Mary River headwaters and well below average in the Bear Paw Mountains. Runoff is forecast to be a little below average on the St. Mary River. The natural flow of the Milk River is expected to be below average.

For more information contact your local Soil Conservation Service office.

ST. MARY and MILK RIVER BASINS

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
SWIFTCURRENT CREEK at Sherburne 2	APR-JUL	101	92	123	79	127	75	110
	APR-SEP	119	93	141	97	150	88	128
ST. MARY RIVER near Babb 2	APR-JUL	370	92	460	275	445	295	404
	APR-SEP	430	91	525	335	515	345	474
MILK RIVER at Eastern Crossing	MAR-SEP	73	75			127	53	97
MILK RIVER at Eastern Crossing 2	MAR-SEP	235	87			320	168	270

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
LAKE SHERBURNE	64.3	28.4	37.3	21.8
FRESNO	127.0	6.6	61.1	51.2
BEAVER CREEK	3.5	0.5	2.8	1.8
NELSON	66.8	3.7	44.4	37.3

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	THIS YEAR AS % OF AVERAGE
MILK HEADWATERS	4	189	89
BEAR PAW	7	94	65
MILK RIVER	11	153	82
ST. MARY	5	175	90
ST. MARY and MILK	12	154	85
BOW RIVER in ALBERTA	7	147	98
OLDMAN RIVER in ALBERTA	5	160	126

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
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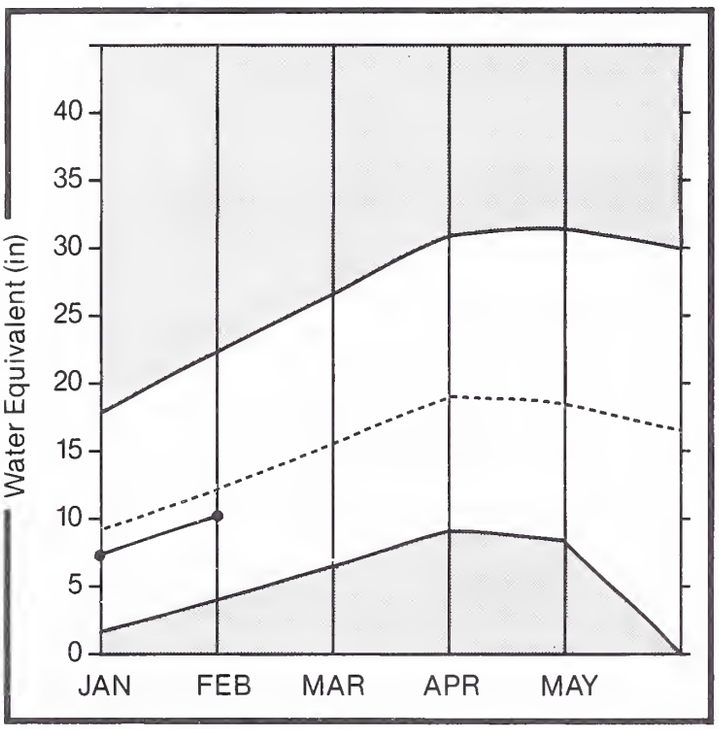
Yellowstone Basin

Mountain snowpack* (inches)



*Yellowstone above Big Horn

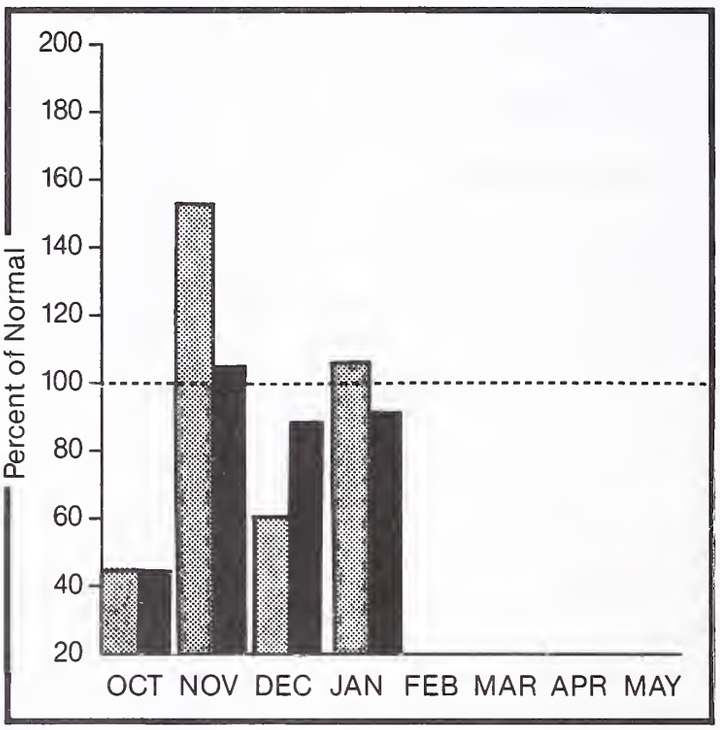
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

During January, the mountain precipitation was near average across the basin. The snowpack is a little below average in Yellowstone National Park and in the headwaters of the Boulder and Stillwater Rivers and below average elsewhere. Spring and summer runoff is expected to be a little below average from the Boulder, Stillwater and Upper Yellowstone Rivers. Other streams are forecast to have below average runoff. NOTE: For more information, see the Hydrologic Effect of 1988 Fires on page 4 of the Water Supply Outlook Report. The Yellowstone Forecasts were not printed in the January 1 Water Supply Outlook Report. If you need a copy of these forecasts, please contact the Snow Survey Office in Bozeman.

For more information contact your local Soil Conservation Service office.

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
YELLOWSTONE at Lake Outlet	APR-JUL	615	104	775	455	715	515	590
	APR-SEP	865	106	1090	635	1000	725	818
YELLOWSTONE at Corwin Springs	APR-JUL	1610	98	2110	1130	1910	1310	1650
	APR-SEP	1960	98	2560	1360	2320	1600	2000
YELLOWSTONE near Livingston	APR-JUL	1820	95	2400	1240	2170	1470	1920
	APR-SEP	2190	94	2870	1510	2610	1770	2330
SHIELDS RIVER near Livingston	APR-JUL	129	86	235	54	177	81	150
	APR-SEP	147	88	255	58	200	94	167
BOULDER RIVER at Big Timber	APR-JUL	325	92	415	225	415	235	353
	APR-SEP	345	90	435	240	445	245	384
WEST ROSEBUD CREEK near Roscoe	APR-JUL	59	92	76	42	77	41	64
	APR-SEP	75	90	92	58	98	52	83
STILLWATER RIVER nr Absarokee 2	APR-JUL	490	94	670	305	670	310	524
	APR-SEP	585	94	785	380	800	375	625
CLARKS FORK RIVER near Belfry	APR-JUL	465	86	645	290	640	290	540
	APR-SEP	520	86	720	320	715	325	603
COONEY RESERVOIR Inflow	APR-JUL	39	80	68	11.6	56	22	49
	APR-SEP	48	80	81	16.8	68	28	60
YELLOWSTONE RIVER at Billings 2	APR-JUL	3380	90			4170	2520	3740
	APR-SEP	4000	91			4970	3030	4410
YELLOWSTONE RIVER at Miles City 2	APR-JUL	4930	87			6450	3410	5640
	APR-SEP	5730	88			7490	3970	6510
YELLOWSTONE RIVER near Sidney 2	APR-JUL	5410	86			7230	3590	6260
	APR-SEP	6220	86			8310	4130	7200

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
MYSTIC LAKE	21.0	5.6	3.8	9.4
COONEY	27.4	19.2	20.2	13.8
BIGHORN LAKE	1356.0	707.1	862.1	683.0
TONGUE RIVER	68.0	39.1	22.6	27.7

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
YELLOWSTONE ab LIVINGSTON	17	147	89
SHIELDS	6	144	85
BOULDER-STILLWATER	3	160	97
CLARK'S FORK-ROCK CREEK	14	155	84
YELLOWSTONE above BIGHORN	31	151	86
LITTLE BIGHORN	5	112	79
WIND RIVER (Wyoming)	30	94	79
BIGHORN RIVER (Wyoming)	31	118	76
BIGHORN BASIN (Total)	56	111	79
TONGUE RIVER (Wyoming)	15	102	73
POWDER RIVER (Wyoming)	15	100	63
YELLOWSTONE RIVER	96	121	80

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

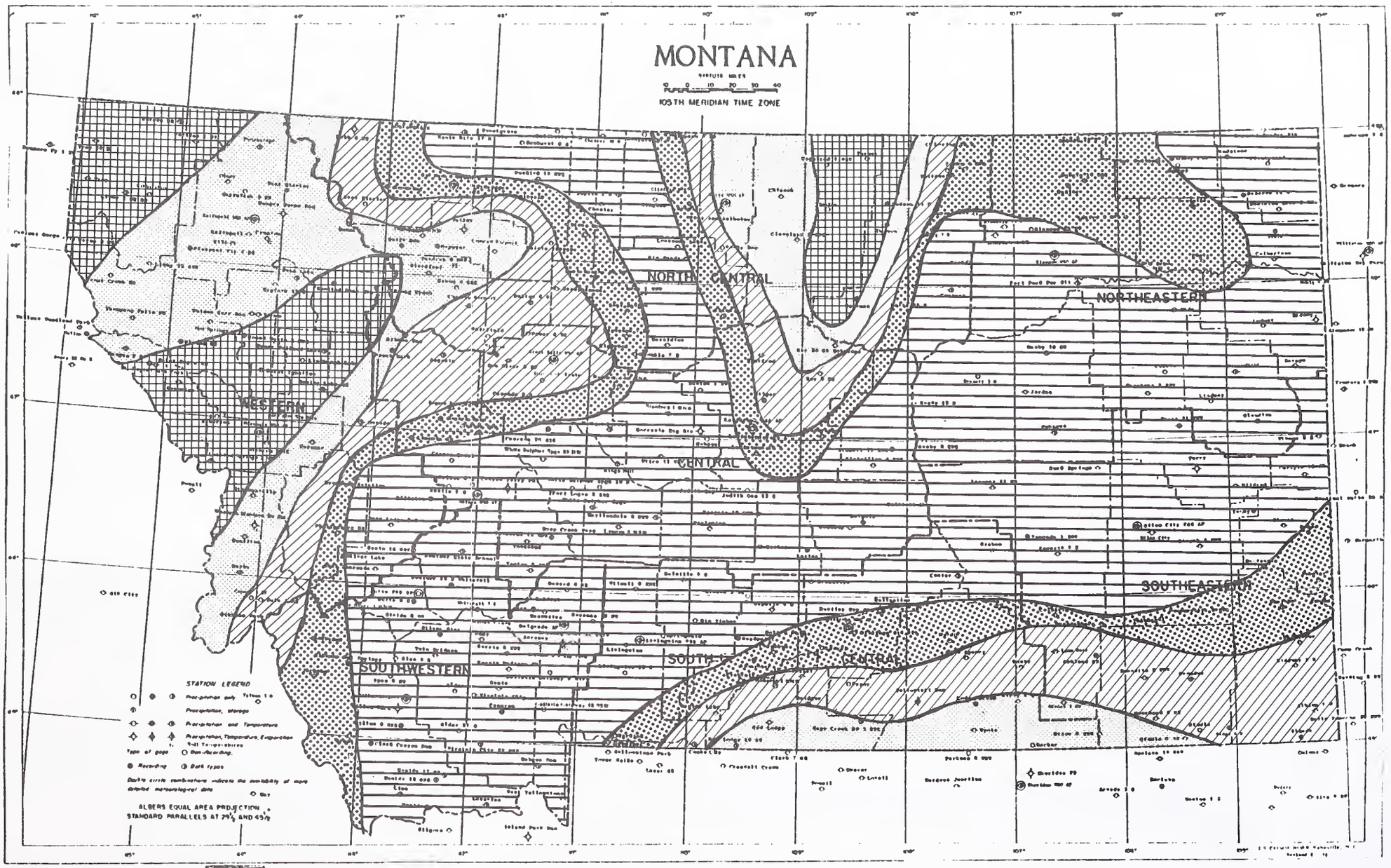
Snow Data Measurements

MONTANA

SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-85
ARCH FALLS	7350	1/26/89	27	5.8	4.6	7.9
ASHLEY DIVIDE	4820	2/07/89	19	4.6	2.5	5.2
BADGER PASS PILLOW	6900	2/01/89	---	24.3	13.7	22.8
BANFIELD MTN PILLOW	5600	2/01/89	---	12.0	8.2	14.1
BANFIELD MOUNTAIN	5600	1/31/89	41	12.8	5.2	16.6
BARKER LAKES PILLOW	8250	2/01/89	---	8.0	6.6	10.2
BASIN CREEK	7180	1/31/89	23	4.9	3.6	5.6
BASIN CREEK PILLOW	7180	2/01/89	---	3.9	3.4	5.0
BEAGLE SPGS PILLOW	8850	2/01/89	---	5.1	4.7	5.3
BEAR PAW SKI AREA	5200	1/28/89	15	3.2	4.0	4.9
BEAVER CREEK PILLOW	7850	2/01/89	---	11.6	8.3	12.2
BIG SKY	7700	1/31/89	33	8.9	8.5	9.9
BLACK BEAR PILLOW	7950	2/01/89	---	27.2	21.0	24.4
BLACK PINE PILLOW	7100	2/01/89	---	7.8	6.8	9.5
BLACK PINE	7100	1/31/89	31	8.2	5.7	9.1
BLACKTAIL	5650	1/27/89	39	9.8	5.6	--
BLOODY DICK PILLOW	7550	2/01/89	---	8.0	5.8	8.7
BOULDER MTN PILLOW	7950	2/01/89	---	13.0	8.1	13.5
BOX CANYON	6670	1/25/89	33	6.9	--	7.7
BOX CANYON PILLOW	6700	2/01/89	---	5.7	3.9	6.3
BOXELDER CREEK	5100	1/28/89	20	3.5	4.0	6.0
BRIDGER BOWL PILLOW	7250	1/30/89	---	13.0	9.8	16.9
BRIDGER BOWL	7250	1/30/89	49	16.3	10.7	18.0
BULL MOUNTAIN	6600	1/26/89	25	4.2	3.0	3.9
CALVERT CR PILLOW	6430	2/01/89	---	5.9	4.8	6.4
CARROT BASIN PILLOW	9000	2/01/89	---	17.8	11.3	18.0
CASHE CREEK PILLOW	7800	2/01/89	---	6.6	5.5	6.0
CHESSMAN RESERVOIR	6200	1/27/89	17	3.2	1.4	2.8
CHICKEN CREEK	4060	1/24/89	48	13.2	7.2	11.0
CLOVER MDW PILLOW	8800	2/01/89	---	9.3	7.3	11.1
COLE CREEK	7850	1/30/89	30	7.4	3.6	11.2
COLE CREEK PILLOW	7850	2/01/89	---	6.2	4.1	10.5
COMBINATION	5600	1/31/89	15	3.4	3.0	3.8
COMBINATION PILLOW	5600	2/01/89	---	3.7	3.3	4.0
COPPER BOTTOM PILLOW	5200	2/01/89	---	8.7	5.8	9.2
COPPER CAMP PILLOW	6950	2/01/89	---	20.9	12.7	23.6
COPPER MOUNTAIN	7700	1/25/89	36	6.4	4.6	7.5
COYOTE HILL	4200	1/31/89	30	8.1	5.8	7.8
CRYSTAL LAKE PILLOW	6050	2/01/89	---	5.4	6.9	9.0
DAISY PEAK	7600	1/26/89	29	5.6	3.6	7.6
DALY CREEK PILLOW	5780	2/01/89	---	6.4	5.7	9.1
DARKHORSE LK. PILLOW	8700	2/01/89	---	14.6	10.8	16.5
DEADMAN CR PILLOW	6450	2/01/89	---	6.9	5.2	7.3
DESERT MOUNTAIN	5600	2/07/89	32	8.8	4.6	10.7
DEVILS SLIDE	8100	1/26/89	39	10.4	7.2	14.5
DISCOVERY BASIN	7050	1/31/89	26	6.1	6.0	7.2
DIVIDE PILLOW	7800	2/01/89	---	8.1	4.7	6.8
DIX HILL	6400	1/29/89	30	8.4	6.0	8.6
DUPUYER CREEK PILLOW	5750	2/01/89	---	9.2	4.2	8.1
EMERY CREEK	4350	2/07/89	37	10.9	6.0	11.8
EMERY CREEK PILLOW	4350	2/01/89	---	9.0	6.3	11.0
FISH CREEK	8000	1/31/89	24	5.1	3.6	6.4
FISHER CREEK PILLOW	9100	2/01/89	---	22.6	15.5	24.9
FLATTOP MTN PILLOW	6300	2/01/89	---	29.7	19.0	31.8
FLEECER RIDGE	7500	1/26/89	34	6.6	5.5	7.3
FOURTH OF JULY	3450	1/25/89	27	6.4	5.4	6.6
FRIDAY HILL	4620	1/25/89	50	13.6	8.3	14.7
FROHNER MEADOWS	6480	1/27/89	23	4.9	3.2	6.0
FROHNER MDWS PILLOW	6480	2/01/89	---	4.9	3.0	6.3
GARVER CREEK	4250	1/31/89	29	7.2	4.3	8.3
GIBBONS PASS	7100	1/31/89	54	16.4	10.7	16.0
GRAVE CRK PILLOW	4300	2/01/89	---	12.6	6.8	12.4
GRAVE CREEK	4300	2/07/89	40	13.2	7.6	11.8
HAND CREEK PILLOW	5030	2/01/89	---	6.8	4.6	9.5
HAWKINS LAKE PILLOW	6450	2/01/89	---	18.0	12.1	18.8
HAWKINS LAKE	6450	1/31/89	62	20.4	12.1	20.0
HEART LAKE TRAIL	4800	1/28/89	52	14.2	9.8	15.2
HEBGEN DAM	6550	1/26/89	40	10.2	5.4	8.6
HELL ROARING DIVIDE	5770	2/06/89	64	21.3	11.0	21.3
HERRIG JUNCTION	4850	1/24/89	64	18.2	11.3	18.3
HOOD MEADOW	6600	1/26/89	27	6.1	4.6	7.3
HOODOO BASIN PILLOW	6050	2/01/89	---	28.7	20.1	31.9
HOODOO BASIN	6050	1/28/89	96	31.1	23.5	34.6
HOODOO CREEK	5900	1/28/89	89	27.6	19.4	31.7
INDEPENDENCE	7850	1/25/89	50	11.0	--	12.0
INTERGAARD	6450	1/26/89	24	4.7	4.3	5.5
JOHNSON PARK	6450	1/26/89	26	4.8	3.5	5.0
KINGS HILL	7500	1/30/89	30	8.2	5.8	9.5
KIWANIS CAMP	3720	1/28/89	6	1.3	1.4	1.7
KRAFT CREEK PILLOW	4750	2/01/89	---	12.1	6.0	8.9
LAKEVIEW CANYON	6930	1/26/89	34	8.4	4.3	8.2
LAKEVIEW RDG. PILLOW	7400	2/01/89	---	9.6	4.9	8.7
LAKEVIEW RIDGE	7400	1/26/89	32	8.0	4.4	7.5
LEMHI RIDGE PILLOW	8100	2/01/89	---	6.5	4.9	7.0
LICK CREEK PILLOW	6860	2/01/89	---	6.7	4.6	6.1
LICK CREEK	6860	1/26/89	26	5.2	5.0	6.5
LONE MOUNTAIN	8880	1/31/89	43	13.5	9.6	15.7
LOWER TWIN PILLOW	7900	2/01/89	---	12.2	7.3	13.5
LOWER TWIN	7900	1/31/89	49	15.3	--	15.0
LUBRECHT PILLOW	4680	2/01/89	---	5.9	4.2	4.1
LUBRECHT FOREST NO 3	5450	1/31/89	20	5.1	2.7	5.3
LUBRECHT FOREST NO 4	4650	1/31/89	9	2.2	1.6	2.9
LUBRECHT FOREST ND 6	4040	1/30/89	10	2.9	1.9	3.4
LUBRECHT HYDROPLOT	4200	1/31/89	19	4.4	3.0	5.8
MADISON PLT PILLOW	7750	2/01/89	---	21.0	--	15.6
MANY GLACIER	4900	2/05/89	44	13.6	5.8	14.5
MANY GLACIER PILLOW	4900	2/01/89	---	10.6	5.4	13.2
MARIAS PASS	5250	1/29/89	35	10.4	5.1	11.6
MAYNARD CREEK	6210	1/30/89	32	9.0	6.3	10.4
MAYNARD CR PILLOW	6210	2/01/89	---	7.6	5.0	8.0
MONUMENT PK PILLOW	8850	2/01/89	---	11.7	7.8	13.9
MONUMENT PEAK	8850	1/25/89	58	14.0	--	17.4
MOSS PEAK PILLOW	6780	2/01/89	---	25.3	14.0	26.0
MOULTON RESERVOIR	6850	2/01/89	27	5.8	3.5	4.5
MT LOCKHART PILLOW	6400	2/01/89	---	13.3	9.7	14.0
MULE CREEK PILLOW	8300	2/01/89	---	9.6	7.0	8.6
NEVADA CREEK PILLOW	6480	2/01/89	---	9.7	5.6	8.5
NEW WORLD	6900	1/27/89	31	7.9	7.8	10.0
NEWTON MOUNTAIN	5600	1/23/89	70	21.6	14.0	23.6
NEZ PERCE CMP PILLOW	5650	2/01/89	---	10.7	8.7	9.9
NEZ PERCE CREEK	6600	1/25/89	22	3.8	3.0	4.8
NOISY BASIN PILLOW	6040	2/01/89	---	28.5	15.6	28.6
N.F. ELK CR PILLOW	6250	2/01/89	---	8.5	5.4	8.5
NORTH FORK JOCKO	6330	1/26/89	98	31.7	16.5	28.2
N.E. ENTRANCE PILLOW	7350	2/01/89	---	5.5	4.1	6.3
NORTHEAST ENTRANCE	7350	2/02/89	29	5.9	3.6	6.8
OPHIR PARK	7150	1/29/89	38	11.0	7.4	11.6
PICKFOOT CRK PILLOW	6650	2/01/89	---	6.5	4.3	6.9
PIKE CREEK PILLOW	5930	2/01/89	---	16.7	10.9	18.5
PIPESTONE PASS	7200	1/25/89	24	3.6	2.0	3.5
PLACER BASIN PILLOW	8830	2/01/89	---	12.6	7.1	10.8
PORCUPINE PILLOW	6500	2/01/89	---	3.8	2.4	4.9
RED MOUNTAIN	6000	1/30/89	44	12.3	6.3	12.9
RED TOP	5260	1/30/89	44	12.3	11.0	19.6
ROCKER PEAK PILLOW	8000	2/01/89	---	6.9	5.4	9.6
ROCKY BOY	4700	1/28/89	11	1.9	2.0	3.4
ROCKY BOY PILLOW	4700	1/28/89	---	2.9	3.0	3.9
SADDLE MTN PILLOW	7900	2/01/89	---	17.0	12.7	18.2
SADDLE MOUNTAIN	7940	1/31/89	59	18.5	11.4	17.6
SHOWER FALLS	8100	1/26/89	40	10.7	8.3	15.7
SHOWER FALLS PILLOW	8100	2/01/89	---	10.1	9.6	15.5
SILVER RUN	6630	1/30/89	10	2.1	1.1	3.6
SILVER RUN PILLOW	6630	2/01/89	---	3.1	2.3	3.6
SKALKAHO PILLOW	7260	2/01/89	---	14.5	12.1	16.8
SKYLARK TRAIL PILLOW	6200	2/01/89	---	24.4	15.7	20.1
S.F. SHIELDS PILLOW	8100	2/01/89	---	9.2	6.6	11.4
SPOTTED BEAR MTN.	7000	2/08/89	37	10.7	6.8	10.6
SPUR PARK PILLOW	8100	2/01/89	---	13.6	8.5	15.0
STAHL PEAK	6030	2/07/89	78	27.4	13.8	26.5
STAHL PEAK PILLOW	6030	2/01/89	---	24.7	12.7	25.1
STRYKER BASIN	6180	1/24/89	73	22.9	10.8	21.7
STUART MILL	6500	1/26/89	23	4.5	4.3	4.4
STUART MOUNTAIN	7400	1/26/89	66	20.2	14.8	21.9
SUCKER CREEK	3960	1/28/89	0	.0	.0	.7
TAYLOR ROAD	4080	1/28/89	13	2.6	2.0	3.1
TEN MILE LOWER	6600	1/26/89	26	5.1	3.2	5.2
TEN MILE MIDDLE	6800	1/26/89	32	6.3	4.3	7.8
TEN MILE UPPER	8000	1/26/89	33	7.4	5.0	9.5
TEPEE CREEK PILLOW	8000	2/01/89	---	9.3	6.5	8.9
TRINKUS LAKE	6100	2/08/89	79	28.8	19.1	26.7
TRUMAN CREEK	4060	1/30/89	14	3.2	1.6	3.1
TV MOUNTAIN	6800	1/26/89	41	11.4	8.5	12.6
TWELVEMILE PILLOW	5600	2/01/89	---	13.2	10.2	12.7
TWENTY-ONE MILE	7150	1/29/89	47	12.4	7.2	12.3
TWIN LAKES PILLOW	6400	2/01/89	---	27.2	19.6	29.0
UPPER HOLLAND LAKE	6200	2/08/89	72	25.5	15.9	24.0
WALDRON PILLOW	5600	2/01/89	---	7.3	4.8	7.5

WARM SPRINGS PILLOW	7800	2/01/89	---	11.5	9.2	17.6
WEASEL DIVIDE	5450	2/07/89	71	24.6	14.0	23.0
WEST YELLOWSTONE	6700	1/29/89	36	8.2	4.4	8.2
WHISKEY CREEK PILLOW	6800	2/01/89	---	13.9	8.3	11.1
WHITE MILL PILLOW	8700	2/01/89	---	15.3	9.6	17.0
WILLOW CREEK	6500	1/30/89	17	3.9	2.0	5.6
WOOD CREEK PILLOW	5960	2/01/89	---	6.5	3.8	6.9

Valley Precipitation



Over 130%

110 - 130%

90 - 110%

70 - 90%

Under 70%

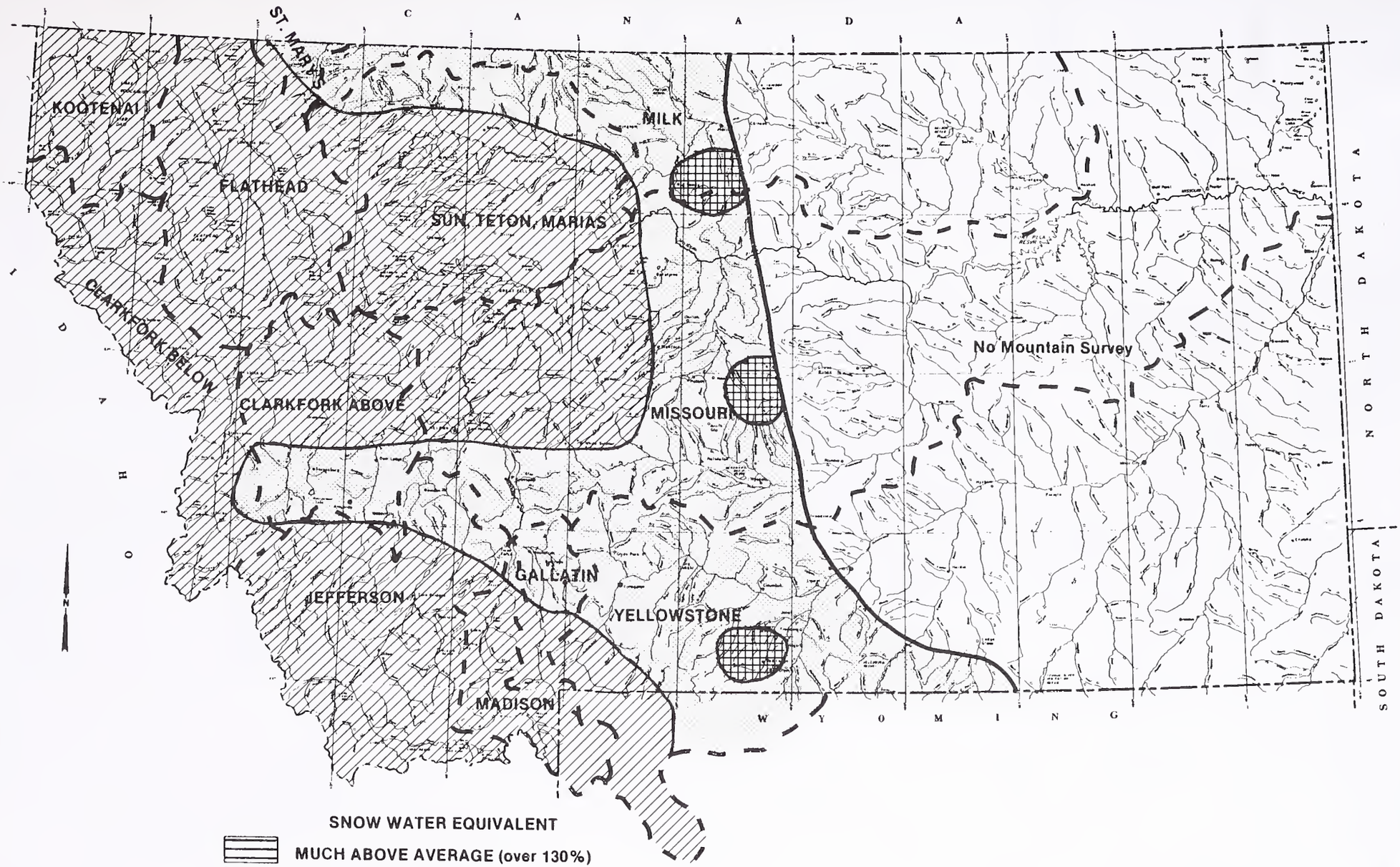
JANUARY 1989

Source: NWS
Great Falls, MT

U.S DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

MOUNTAIN SNOWWATER EQUIVALENT FOR MONTANA



SNOW WATER EQUIVALENT

- MUCH ABOVE AVERAGE (over 130%)
- ABOVE AVERAGE (110-130%)
- NEAR AVERAGE (90-110%)
- BELOW AVERAGE (70-90%)
- MUCH BELOW AVERAGE (below 70%)
- NO MOUNTAIN SURVEY

%1961-85 AVERAGE

FEBRUARY 1,1989

0 25 50 75 100 MI

0 50 100 150 KM

SOURCE:
Information provided by SCS Snow Survey Personnel

JUNE 1985 4-R-39296-1

The Following Organizations Cooperate With The Soil Conservation Service In Snow Survey Work

Canadian

Department of the Environment
- Atmospheric Environment Service
- Water Management Service

British Columbia Ministry of Environment
- Inventory and Engineering Branch, Hydrology Section

Alberta Environment
- Technical Services Division

Federal

U.S. Department of Agriculture
- Forest Service

U.S. Department of the Army
- Corps of Engineers

U.S. Department of Commerce
- NOAA, National Weather Service
- National Environmental Satellite Service

U.S. Department of the Interior
- Bureau of Indian Affairs
- Fish and Wildlife Service
- Geological Survey
- National Park Service
- Bureau of Reclamation

U.S. Department of Energy
- Bonneville Power Administration

State

Montana Conservation Districts
Montana Department of Fish, Wildlife, and Parks
Montana Department of Natural Resources and Conservation
Montana Department of State Lands
Montana State University - Agricultural Experiment Station
University of Montana - School of Forestry

Private

Big Sky of Montana
Butte Water Company
Confererated Salish & Kootenai Tribes
Flathead Valley Comminity College
Montana Power Company
Pondera County Canal & Reservoir Company

Other organizations and individuals furnish information for the snow survey reports.
Their cooperation is gratefully acknowledged.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
SNOW SURVEY UNIT
Federal Bldg., Rm. 443
10 East Babcock Street
Bozeman, MT 59715

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